Management and Outcomes of Intra-articular Ballistic Injuries of the Hand

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Background and Objective: Intra-articular ballistic injuries of the hand present unique challenges not commonly encountered with other gunshot wounds (GSWs). Due to their rarity, data on demographics, operative trends, and joint preservation outcomes are limited. This study examines management strategies with an emphasis on factors associated with joint salvage.

Methods: Patients with hand GSWs treated from 2021–2025 at a metropolitan academic health system—including three Level 1 trauma centers—were identified using CPT and ICD-10 codes. Intra-articular involvement patients were included. Demographics, injury mechanism, procedures, and complications were reviewed. Unpaired t-tests compared patients with salvaged versus unsalvageable joints.

Results: Of 83 patients with hand GSWs, 48 were intra-articular. Most were male (89.6%) with a mean age of 30.4 years. Black was the most common racial group (50%) and most patients (75%) had government insurance. Common comorbidities included tobacco use (43.8%) and obesity (16.7%). Assault was the most frequent mechanism (58.3%). Injuries involved the left hand in 73% of cases; the metacarpophalangeal (MCP) joint in 80%; and the third ray in 41.7%. Open reduction and internal fixation (ORIF) was the most common operation (70.8%). Many patients underwent multiple procedures. Frequent complications included ER/hospital returns (27.1%) and infection (6.3%). Eight cases (16.7%) were deemed unsalvageable, resulting in 5 amputations, 2 arthrodeses, and 1 arthroplasty. These patients tended toward being younger ($p = 0.2402$), having greater bone ($p = 0.5195$) and soft tissue loss ($p = 0.1425$), longer hospital stays ($p = 0.8459$), and more frequent government insurance ($p = 0.2654$).

Conclusions: Intra-articular hand GSWs frequently involve the MCPJ and third ray. Unsalvageable cases often involve younger patients with greater tissue damage. These findings may guide physician-patient discussions on prognosis and treatment planning. Larger studies are needed to identify predictors of joint preservation.